



**December 3, 2003
(Updated September 2005)**

**GENERAL USE LEVEL DESIGNATION FOR PRETREATMENT (TSS)
For
Aqua-Swirl Concentrator**

**PILOT USE LEVEL DESIGNATION FOR BASIC (TSS), ENHANCED,
PHOSPHORUS AND OIL TREATMENT
For
Aqua-Filter System**

Ecology's Decision:

Based on Aqua Shield's application submissions and recommendations by the Technical Review Committee (TRC), Ecology hereby issues the following use level designations:

- 1. General Use Level Designation (GULD) for the Aqua-Swirl Concentrator for pretreatment use (a) ahead of infiltration treatment, or (b) to protect and extend the maintenance cycle of a Basic or Enhanced Treatment device (e.g., sand or media filter). This GULD applies to Aqua-Swirl units sized at an operating rate of no more than 23 GPM/sf at the Water Quality design flow rate as determined using the Western Washington Hydrology Model (WWHM).**
- 2. Pilot Use Level Designation (PULD) for the Aqua-Filter System for Basic Treatment.**
- 3. PULD for the Aqua-Filter System for Enhanced Treatment.**
- 4. PULD for the Aqua-Filter System for Phosphorus Treatment.**
- 5. PULD for the Aqua-Filter System for Oil Treatment.**
- 6. The Pilot Use Level Designations expire on October 1, 2006 unless extended by Ecology, and are subject to the conditions specified below.**
- 7. Ecology finds that the Aqua-Swirl Concentrator, sized at an operating rate of no more than 23 GPM/sf, could also provide:**
 - Water quality benefits in retrofit situations.**
 - The first component in a treatment train.**

Ecology's Conditions of Use:

Aqua-swirl concentrators and Aqua-Filter Systems shall be designed, installed, and maintained to comply with these conditions:

- 1. Aqua-Swirl Concentrators and Aqua-Filter systems must be designed, assembled, installed, operated, and maintained in accordance with Aqua-Shield, Inc.'s applicable manuals and documents and the Ecology Decision.**
- 2. Aqua Shield, Inc. commits to submitting a QAPP for TRC review and Ecology approval by March 31, 2004 that meets the TAPE requirements for attaining a GULD for Basic, Enhanced, Phosphorus, and Oil Treatment. Specify appropriate techniques to prevent TSS sampling and analysis errors, and to obtain adequate data verifying proposed GPM/sf operating/design rates. Specify techniques to measure the treatment train (Aqua Swirl plus Filter Chamber) efficiency; the individual component efficiencies may also be measured, at Aqua Shield's discretion.**
- 3. Local jurisdictions must file a "Pilot Level Technologies Notice of Intent" form with the Department of Ecology prior to authorizing Aqua Filter for a Pilot Use Level application.**
- 4. Aqua-Shield, Inc. shall complete all required testing and submit a TEER for TRC and Ecology review by March 31, 2006.**
- 5. Aqua-Shield, Inc. may request Ecology to grant deadline or expiration date extensions, upon showing cause for such extensions.**
- 6. Discharges from the Aqua-Swirl Concentrator and Aqua-Filter System shall not cause or contribute to water quality standards violations in receiving waters.**

Applicant: Aqua Shield, Inc.

Applicant's Address: 2733 Kanasita Drive, Suite B
Chattanooga, TN 37343

Application Documents:

Aqua Filter Stormwater Treatment System, Application for Stormwater Quality Treatment Pilot Use Designation (Short-Term) for Basic, Enhanced, Oil, and Treatment Train Treatment in Western Washington submitted to Stan Ciuba, Washington State Department of Ecology (August 21, 2003)

Applicant's Use Level Request:

Pilot Use Designation as a Basic, Enhanced, Oil, and Treatment Train Treatment device in accordance with Ecology's 2001 western WA stormwater manual.

Applicant's Performance Claims:

- Net annual 91% TSS removal using US Silica OK-110 as a laboratory simulant.
- 92 to 98% TSS (75 micron particle size) reductions using perlite and cellulose filter media.
- 95% total phosphorus, and over 80% zinc, copper, and aluminum reductions using perlite and cellulose
- filter media.

Technical Review Committee's Recommendations:

The TRC finds that:

- The Aqua Swirl Concentrator, sized at no more than 23 GPM/sf, should provide equivalent performance to a presettling basin as defined in the most recent version of *Stormwater Management Manual for Western Washington, Volume V, Chapter 6*.
- Aqua Shield, Inc. should be given the opportunity to demonstrate, through additional laboratory and field testing, whether the Aqua Filter System can attain Ecology's Basic, Enhanced, Phosphorus, or Oil Treatment goals.

Findings of Fact:

1. Laboratory testing was completed by Tennessee Tech University for US Silica OK-110 silica using an Aqua-Swirl Concentrator Model AS-3. Laboratory results for this 50 to 125-micron silica showed 80% removal at about 23 GPM/sf operating rate. Estimated annual TSS removal efficiency, based on Portland, ME rainfall, is 91%.
2. Bench-scale laboratory testing was completed by Analytical Industrial Research Laboratories, Inc. on perlite and cellulose media (which are used in the Filter Chamber) for a blend of 50% motor oil and 50% diesel fuel at 160 mg/L and 75-micron particle size TSS at 110 mg/L. The media provided 91 to 98% TSS and 92 to 97% TPH removal at operating rates ranging from 41 to 68 GPM/sf.
3. Various field studies are underway in Michigan, Tennessee, New York, Oregon, Vermont, Maryland, Washington, and California. No results are available.
4. The system is maintained using a vacuum truck and requires entry into the filter chamber to remove the filter bags.

Other Aqua-Filter Related Issues to be Addressed By the Company:

1. No field test results are available, so it is unknown whether the Aqua Filter System can reliably attain 80% removal of the finer particles comprising TSS found on local highways, parking lots, and other high-use areas at the design operating rate. Aqua Shield, Inc. should test a variety of operating rates and filter media to establish conservative design rates. Pollutant loading capacities of and breakthrough data on the filter media should also be determined to better predict maintenance cycles.
2. Resuspension. Swirl concentrators are prone to resuspension, especially when sumps are partially filled with sediments and at greater than design flow rates. To prevent resuspension Aqua Shield, Inc. should evaluate whether a deeper sump should be standard on local systems and the use of diverters for higher than design flow rates..
3. Determine whether the system removes used motor oil adsorbed to fine particles, rather than free product/clean motor oil.
4. The system should be tested under normal operating conditions, such that the swirl concentrator and filter beds are partially filled with pollutants. Results obtained for “clean” systems may not be representative of typical performance.
5. Consider laboratory testing with US Silica Sil-Co-Sil 106. Testing with US Silica OK-110 will be considered as demonstrating pre-treatment rather than basic treatment performance.
6. Develop raw material specifications for all media to ensure that all supplies of media meet minimum physical/chemical standards.

Technology Description:

Download at <http://www.aquashieldinc.com>

Contact Information:

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Applicant website:

<http://www.aquashieldinc.com>

Ecology web link:

<http://www.ecy.wa.gov/programs/wq/stormwater/newtech/index.html>

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